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Examiner: David A. Zameke
Title: SOLID-STATE IMAGING DEVICE AND METHOD FOR PRODUCING THE SAME
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REMARKS

Reconsideration is requested in view of the above amendments and the following remarks. Editorial revisions have been made in claims 1, 7, 12 and 17. Support for the revisions can be found at page 3, lines 18-21 and Figs. 1-3, among other places. No new matter has been introduced. Claims 1-17 remain pending in the application.

Claim Objections

Claim 1 is objected to due to informalities. Editorial revisions have been made to address the Examiner's concern.

Claim Rejections – 35 USC § 102

Claims 1, 2 and 6 are rejected under 35 USC § 102(e) as being anticipated by Kinsman (US 2004/0038442). Applicants respectfully traverse this rejection.

Claim 1 requires a wiring for connecting electrically the inside of a package with the outside of the package, including an internal electrode disposed on a surface of a substrate, an external electrode disposed on a rear surface of the substrate and an end face electrode disposed under a rib so as to penetrate the substrate along a side face of the substrate, wherein the end face electrode connects the internal electrode and the external electrode. Claim 1 also requires that at least a part of the end face electrode, the side face of the substrate, an outer side face of the rib and a side face of a transparent plate form a substantially coplanar surface.

The flat side face of the present package allows accurate positioning of the solid-state imaging device within a lens barrel. When mounting the solid-state imaging device to the lens barrel, the position of the solid-state imaging device can be determined easily and precisely by aligning the side face of the package with the internal surface of the lens barrel. If the side face of the package is not flat, it would become difficult to position the solid-state image device within the lens barrel (see, e.g., page 2, lines 6-16 of the present specification). The present wiring also allows the substrate of the solid-state imaging device to have a simple configuration and thus facilitates the miniaturization of the solid-state imaging device (see, e.g., page 2, lines 19-25 of the present specification).

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Kinsman fails to disclose a wiring including an internal electrode disposed on a surface of a substrate, an external electrode disposed on a rear surface of the substrate and an end face electrode disposed under a rib so as to penetrate the substrate along a side face of the substrate, wherein the end face electrode connecting the internal electrode and the external electrode, as required by claim 1. While the rejection cites a Kinsman castellated solder pad as suggesting the external electrode and the end face electrode required in claim 1, Applicants respectfully contend that the reference in fact does not teach an end face electrode disposed under a rib. Instead, the Kinsman castellated solder pad is formed on a portion of the side face of a raised wall as well as the side face of a carrier substrate (see Kinsman, Fig. 12), rather than being disposed under a rib so as to penetrate the substrate along a side face of the substrate, as required by claim 1. In addition, in view of the Kinsman manufacturing process (Kinsman, paragraph [0036]), it is impossible for the castellated solder pad to be disposed under the raised wall because the solder pad is formed after the raised wall is bonded to a substrate.

Kinsman also fails to disclose that at least a part of the end face electrode, the side face of the substrate, an outer side face of the rib and a side face of a transparent plate form a substantially coplanar surface, as recited in claim 1. On the contrary, the Kinsman castellated solder pad is formed on a portion of the side face of the raised wall as well as the side face of the carrier substrate and forms a stepped portion on the side face of the raised wall. Thus it is impossible for the solder pad to have a coplanar surface with the side face of the raised wall.

For at least these reasons, claim 1 is patentable over Kinsman. Claims 2 and 6 depend from claim 1 and are patentable along with claim 1 and need not be separately distinguished at this time. Applicants are not conceding the relevance of the rejection to the remaining features of the rejected claims.

Claims 12-15 are rejected under 35 USC § 102(e) as being anticipated by Kinsman. Applicants respectfully traverse this rejection.

Claim 12 requires cutting a perforation conductive layer, a base material, a rib formation member and a transparent plate sequentially in a single operation in a direction

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perpendicular to the surface of the base material and in a direction that divides a width in a planar shape of the rib formation member into halves so as to separate into respective pieces of solid-state imaging devices. The present perforation conductive layer is common to the adjacent solid-state imaging devices. As a result of the present cutting process, each half of the perforation conductive layer forms an end face electrode of a separated solid-state imaging device at the same time when the solid-state imaging devices are separated (see page 9, lines 24-35 of the present specification and Figs. 4A-4F).

Kinsman fails to disclose cutting a perforation conductive layer, a base material, a rib formation member and a transparent plate sequentially in a single operation in a direction perpendicular to the surface of the base material and in a direction that divides a width in a planar shape of the rib formation member into halves so as to separate into respective pieces of solid-state imaging devices, as required by claim 12. Kinsman discusses a via connecting conductive traces on upper and lower surfaces of the carrier substrate. However, the Kinsman via is not cut into halves at the time when the image sensor packages are separated. In fact, the Kinsman via is not common to the adjacent image sensor packages and an end face electrode as required by claim 12 would not be formed at the same time when the image sensor packages are separated. Thus, the present perforation conductive layer is distinct from the Kinsman via.

For at least these reasons, claim 12 is patentable over Kinsman. Claims 13-15 ultimately depend from claim 12 and are patentable along with claim 12 and need not be separately distinguished at this time. Applicants are not conceding the relevance of the rejection to the remaining features of the rejected claims.

Claim Rejections – 35 USC § 103

Claims 3-5, 8-11 and 17 are rejected under 35 USC 103(a) as being unpatentable over Kinsman. Applicants respectfully traverse this rejection. Claims 3-5, 8-11 and 17 depend from claim 1 and are patentable over Kinsman for at least the same reasons discussed above regarding claims 1, 2 and 6. Applicants are not conceding the relevance of the rejection to the remaining features of the rejected claims.

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Claim 7 is rejected under 35 USC 103(a) as being unpatentable over Kinsman in view of Wu (US 5,811,799). Applicants respectfully traverse this rejection. Claim 7 depends from claim 1 and is patentable over Kinsman in view of Wu for at least the same reasons discussed above regarding claims 1, 2 and 6. Wu does not remedy the deficiencies of Kinsman. Applicants are not conceding the relevance of the rejection to the remaining features of the rejected claim.

Claim 16 is rejected under 35 USC 103(a) as being unpatentable over Kinsman. Applicants respectfully traverse this rejection. Claim 16 depends from claim 12 and is patentable over Kinsman for at least the same reasons discussed above regarding claims 1, 2 and 6. Applicants are not conceding the relevance of the rejection to the remaining features of the rejected claims.

Claim Rejections – Double Patenting

Claims 1-11 are provisionally rejected on the ground of obviousness-type double patenting as being unpatentable over claims 1-4 of copending Application No. 10/970,533. Applicants respectfully traverse this rejection.

The reference claims require a plurality of wiring members that electrically lead from an internal space of a case formed by the wiring board and the ribs to the outside. While the present claims 1-11 focus on an end face electrode disposed under the rib so as to penetrate the substrate along a side face of the substrate, which allows the substrate of the solid-state imaging device to have a simple configuration and thus facilitates the miniaturization of the solid-state imaging device, the reference claims do not specify an end face electrode. Therefore, claims 1-4 of Application No. 10/970,533 do not teach or suggest the present claims 1-11 and are patentably distinct from the present claims 1-11.

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In view of the above, favorable reconsideration in the form of a notice of allowance is respectfully requested. Any questions regarding this communication can be directed to the undersigned attorney, Douglas P. Mueller, Reg. No. 30,300, at (612) 455-3804.

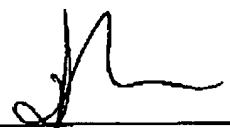


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DPM/cy

Respectfully submitted,

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